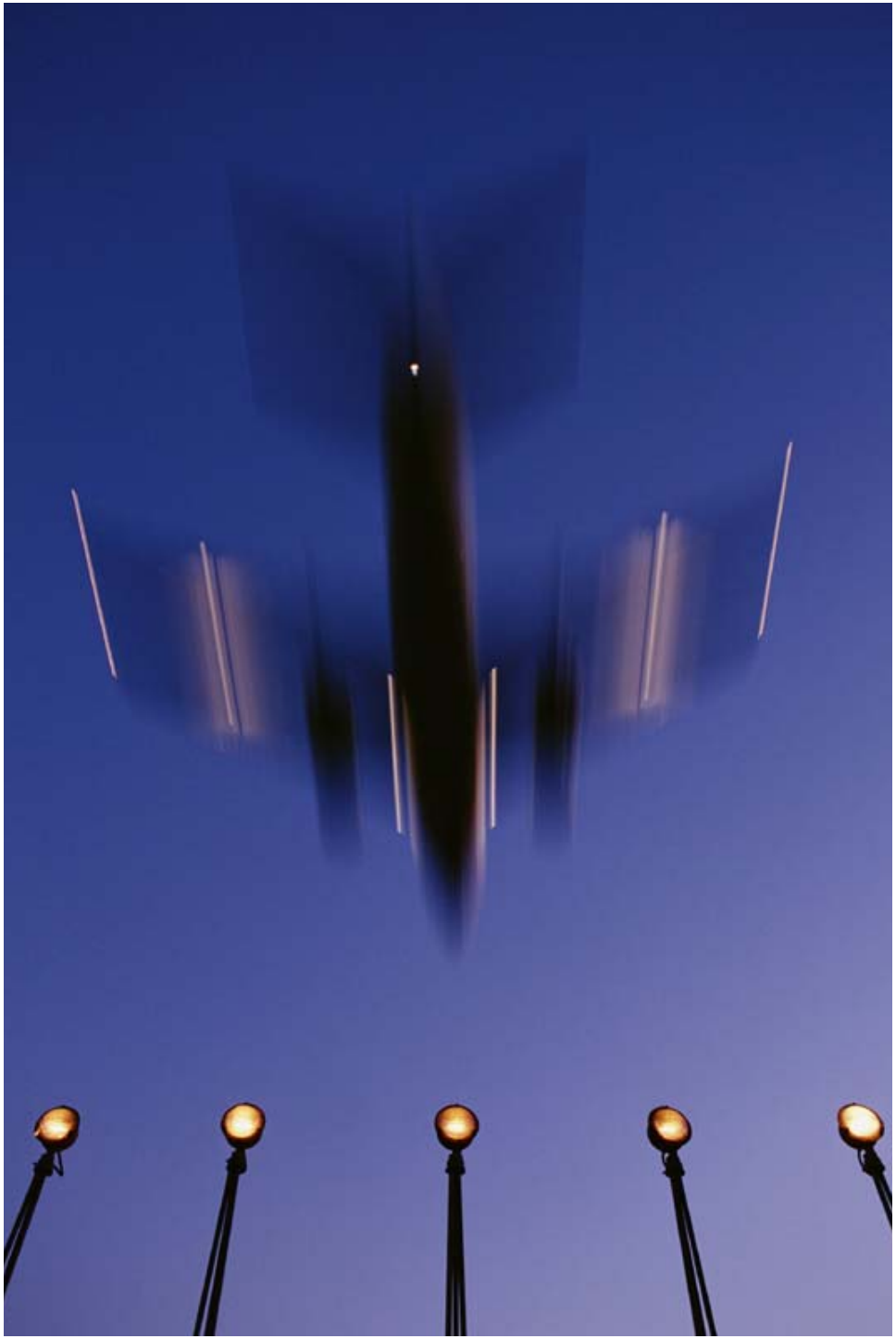

NASA 5th Integrated CNS Technologies Conference and Workshop

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SITA AIRCOM Datalink Implementation Status

Kathleen Kearns
Phone: 703-491-0661
Kathleen.Kearns@sita.aero
www.sita.aero

Data link is not new……..

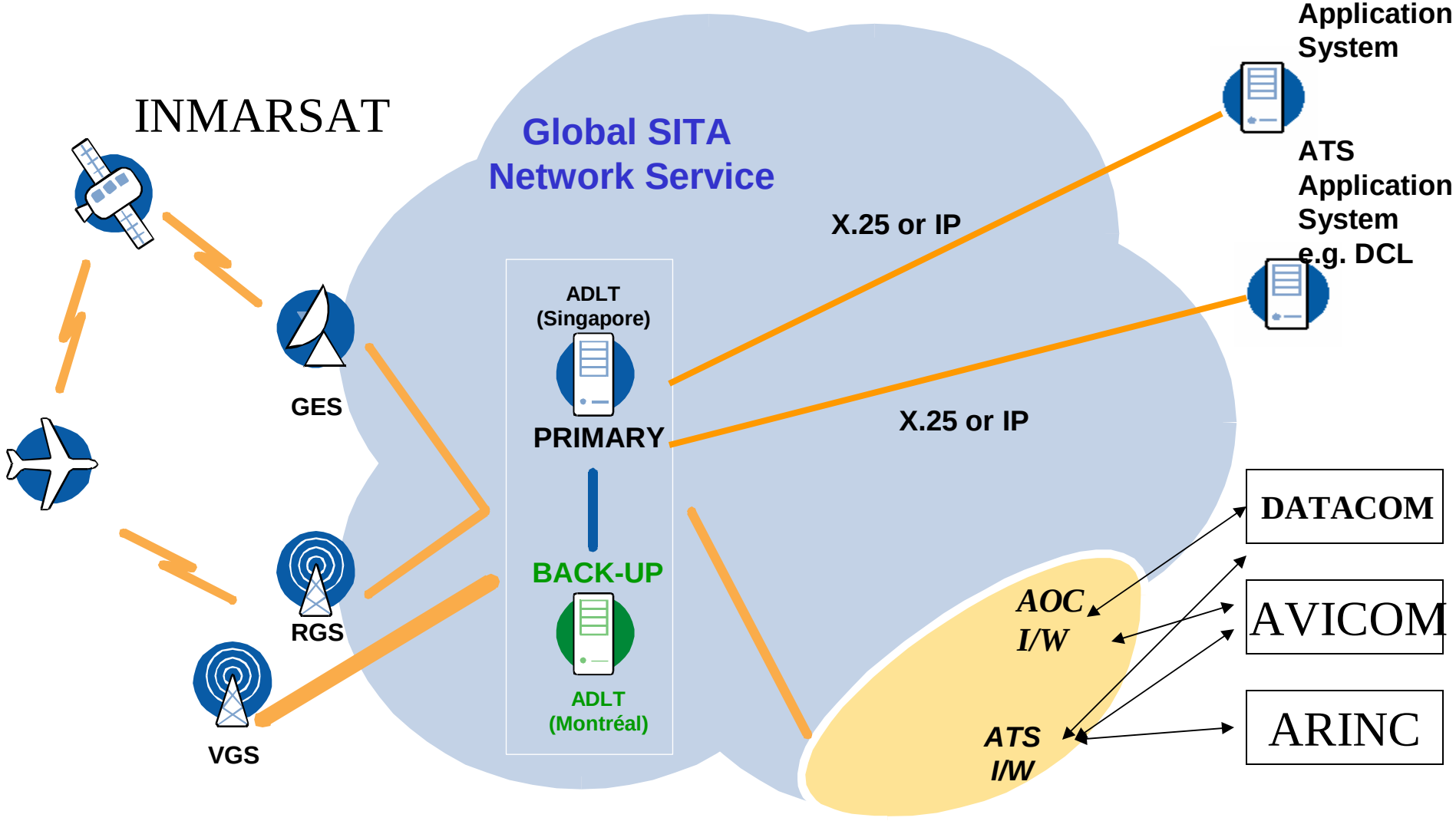
- **Airlines have been using it for over 20 years for Operational Communications**
- **Air Navigation Service Providers have been using it for over 15 years for initial ATC applications**
- **Global coverage via VHF and Satellite media**
- **Over 10,000 aircraft are equipped with ACARS data link**
- **CPDLC/ATN/VDL2, as being implemented by Link2000+, is a significant next step forward to enable delivery of increasingly sophisticated ATC messages**

ATS Datalink Implementations*

- **Addressable point-to-point**
  - **Initial ATS ACARS-based implementations**
    - **PDC**
    - **DCL**
    - **ATIS**
    - **OCL**
    - **TWIP**
    - **DDTC**
  - **FANS-1/A CPDLC, ADS-C (aka ADS-A) (ACARS-Based, Links: POA, VDL Mode 2/AOA, SATCOM Data-2)**
  - **ATN-Based CPDLC via VDL Mode 2/ATN**
- **Broadcast**
  - **FIS-B (VDL Mode 2 broadcast-based and UAT-based in US)**
  - **TIS-B (UAT- and 1090 Mode S ES-based in US)**
  - **ADS-B (UAT- and 1090 Mode S ES-based in US)**

*** Above are examples of some of the ATS datalink implementations around the world, some of which are implemented in the US.**

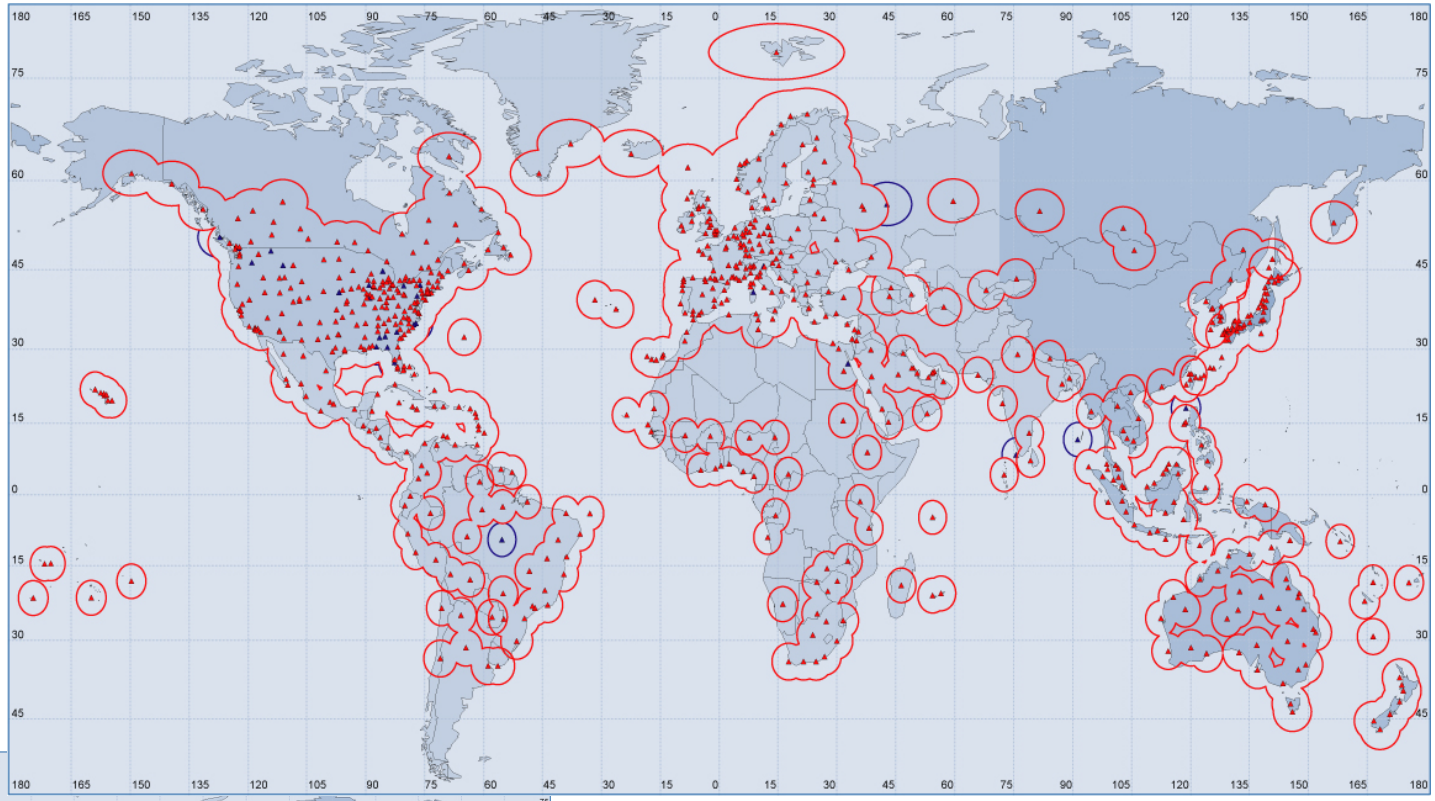
AIRCOM Data Link Service

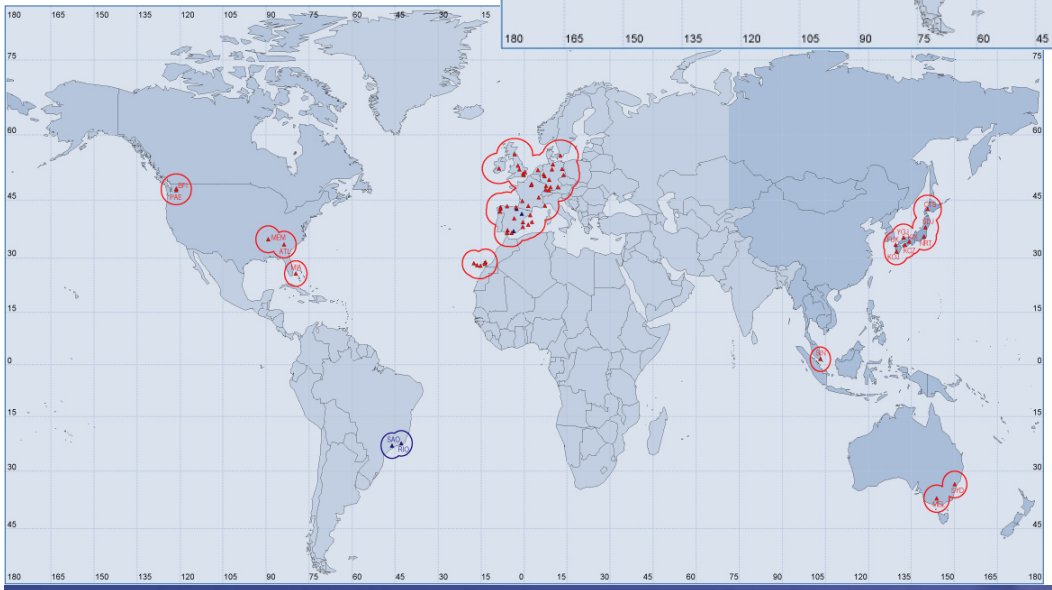


VHF Coverage*

- **World's largest a/g VHF datalink network with 855 Ground stations worldwide in over 152 countries.**
- **150 contracted airlines serving 5000+ aircraft.**

***** **As of January 2005. On-line in red, planned in blue.**





VDL Mode 2 Coverage

- **50 VDL Mode 2 sites on-line as of April 28, 2005**

Americas VHF AIRCOM ACARS Coverage*

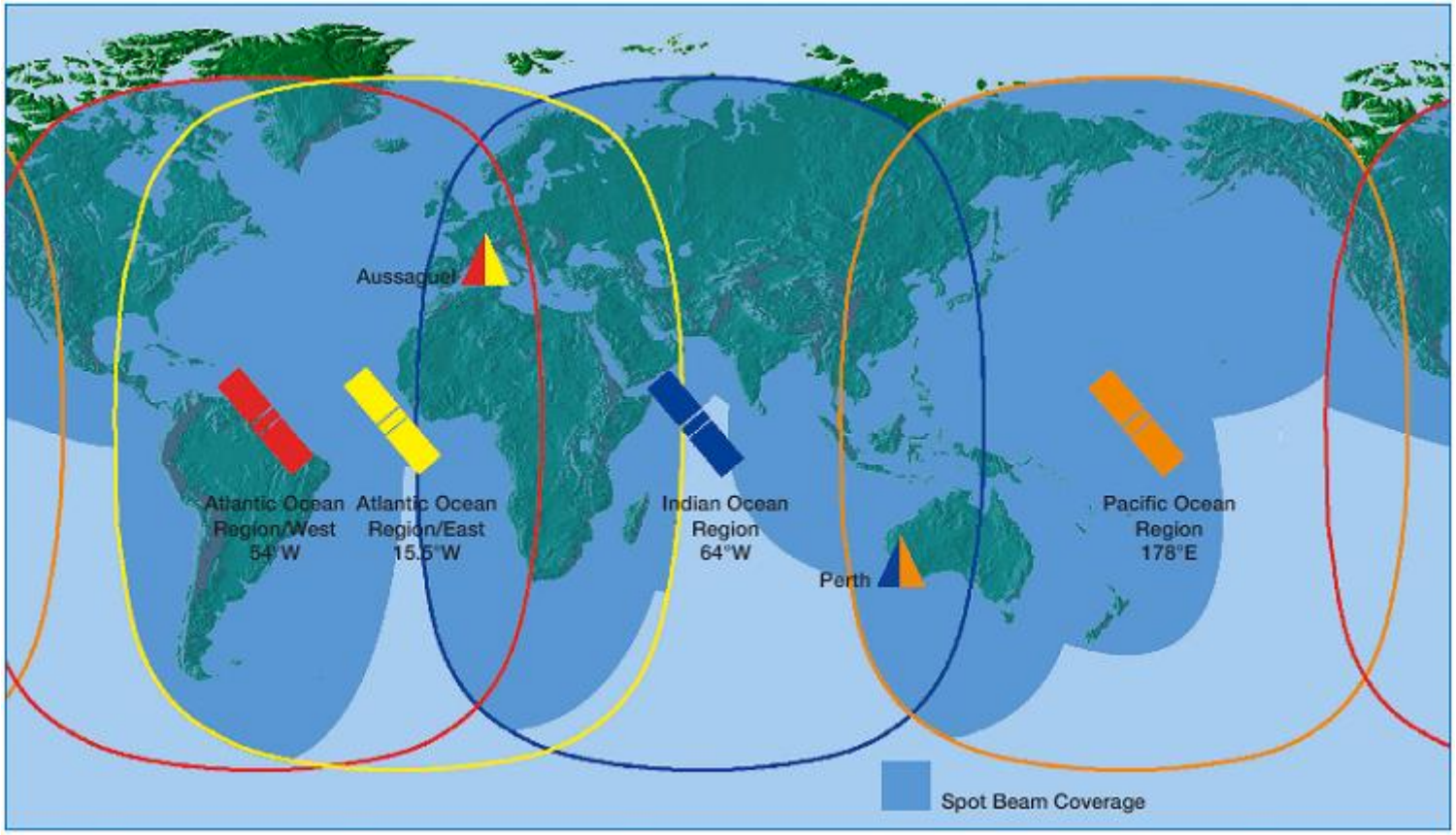
- **VHF *AIRCOM* Coverage in North America as of**

  April 28, 2005:
  - **209 Ground Stations in US**
  - **43 Ground Stations in Canada**
  - **13 Ground Stations in Mexico**
  - **SITA committed to expand number of ground stations in North America to 330 by November 2005**
  - **7 NAM airlines using SITA VHF in NAM**

*** Map as of January 2005, Altitude 30,000 feet-On-line RGS** are in red, planned are in blue**

**** Close to 50 of the stations in the US are actually the SITA next generation VHF Ground Stations, referred to as VGSs, which are capable of supporting VDL Mode 2 and VHF ACARS in parallel. Five of the US VGSs have a radio configured for VDL Mode 2.**

Worldwide Satellite AIRCOM Coverage



Future Trends ....

- **ACARS VHF networks have typically been deployed by the airline communications service providers SITA and ARINC**
- **Some Air Navigation Service providers in the Link2000+ program want to continue with this arrangement**
  - **Nav Portugal, Eurocontrol Maastricht**
- **Others prefer to take on responsibility themselves for the VHF network infrastructure provision and operation in partnership with an airline service provider**
  - **DFS, AENA**

ATN Implementations

- **US FAA Initial Daily Use of CPDLC Build 1 in Miami on October 7, 2002. No longer in use as of October 1, 2004. Ongoing work on datalink roadmap development.**
- **Eurocontrol ATN Controller Pilot Data Link program (Link2000+) calls for aircraft in high density airspace to use ATN messaging over VDL Mode 2 for CPDLC.**
  - **Three step approach**
    - **Pioneer Airlines**
    - **Incentives**
    - **Mandate**
  - **All Link2000+ area upper airspace to be covered by 2009**
    - **Maastricht UAC (Eurocontrol) (Service Available Now), Karlsruhe UAC (DFS), Reims ACC (DSNA), Roma ACC (ENAV), Lisboa ACC (Nav Portugal), Switzerland UAC (Skyguide), Canarias ACC (AENA), Shannon UAC (IAA)**

SITA and Link2000+

- **Airlines that have elected to use the SITA ATN Service include:**
  - **Lufthansa (20 A320)**
  - **Federal Express (15+ A310)**
  - **Air Berlin (2 B737)**
  - **Air Europa (19 B737)**
  - **Hapag-Lloyd (20 B737)**
- **Air Navigation Service Providers that have elected to use or partner with SITA include:**
  - **DFS in Germany (Partner)**
  - **AENA in Spain (Partner)**
  - **NAV EP in Portugal**
  - **Eurocontrol Maastricht UACC (via "internetworking")**

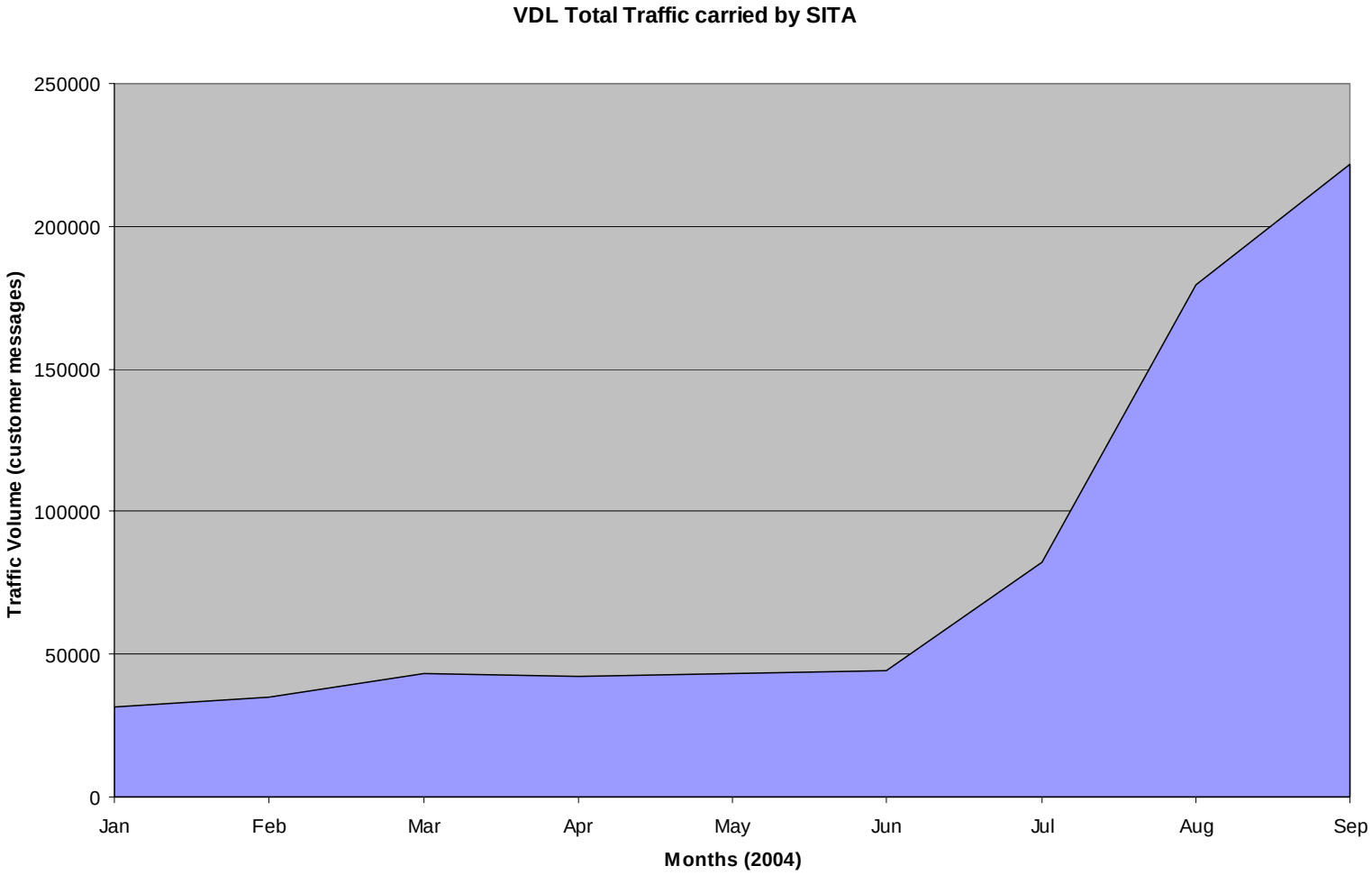
Maastricht UACC use of SITA ACARS for FANS-1/A

- **Maastricht UACC started "accommodating" FANS 1/A equipped aircraft in PETAL Phase 2 and this path generated the vast majority of the PETAL CPDLC traffic**
- **Maastricht's PETAL system used the SITA ACARS services to communicate with FANS-1/A aircraft and the new Link 2000+ CPDLC applications continues to use the SITA ACARS service for FANS-1/A aircraft.**
- **Link2000+ States need to make a collective decision on whether or not to accommodate FANS 1/A aircraft**
- **Numbers of FANS 1/A equipped aircraft is expected to continue to rise**
- **FANS 1/A aircraft will be exempt from the planned Mandate**

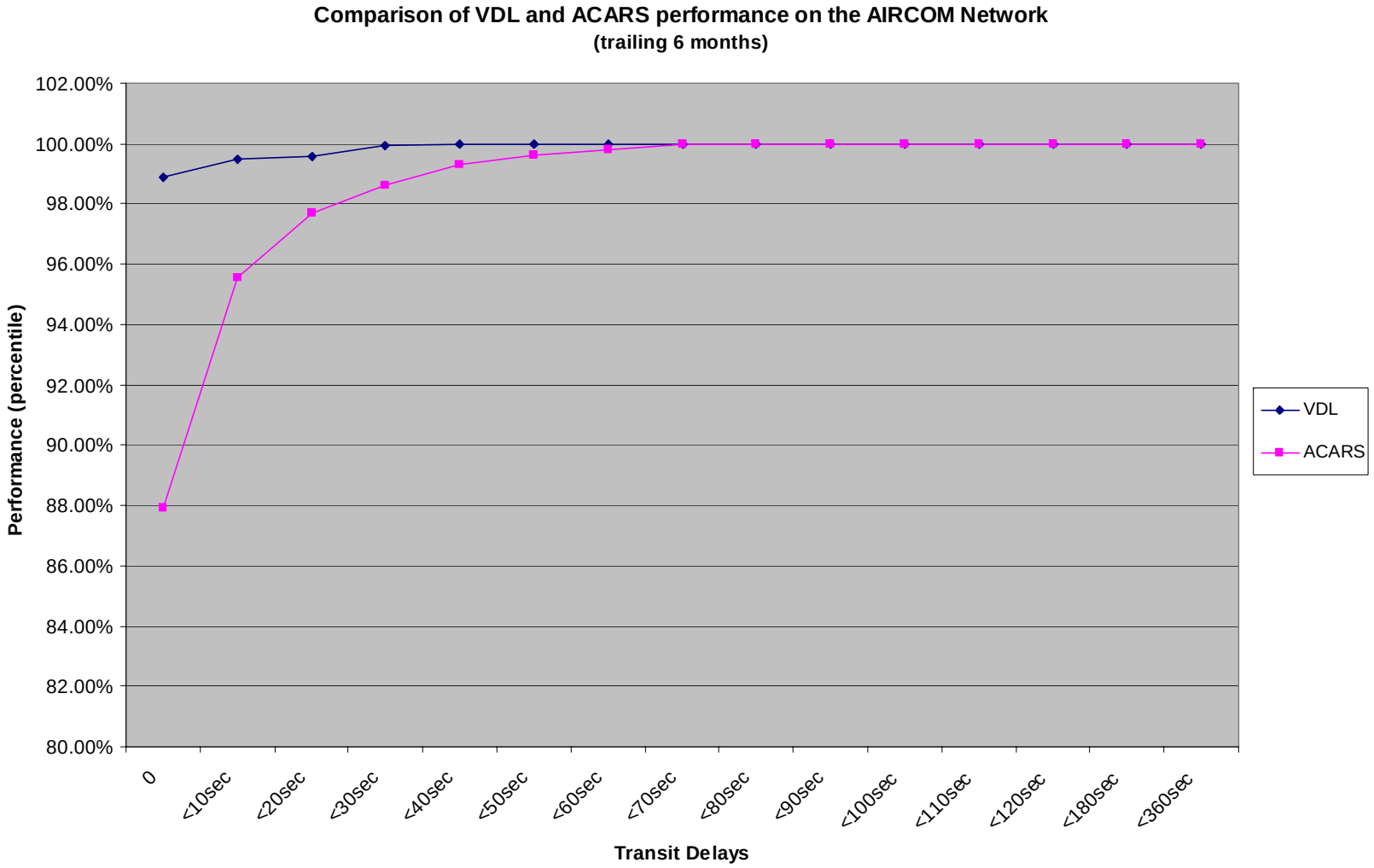
VDL Customers

- **Operators using the SITA VDL Service include:**
  - **AAL (25), AEA (4) , AFL (18), AFR (15), DLH (17), FDX (12), JAL (12), QFA (19), RAM (2), SWR, TRS (3), UVA (2)**
  - **Average monthly total of 170 VDL equipped aircraft**

VDL Traffic


VDL Total Traffic carried by SITA
Traffic Volume (customer messages)
250000
200000
150000
100000
50000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Months (2004)

VDL Performance



ATN/VDL Performance

- **Evaluated via Eurocontrol laboratory testing/Eurocontrol flight trials/Air Europa delivery flights and Air Europa revenue flights**
  - **Over 22 flight hours of service evaluation**
  - **Average application level round trip delay is around the two second mark**
  - **Eurocontrol PSG/12 quote…**

Future CNS Services – ADS-B

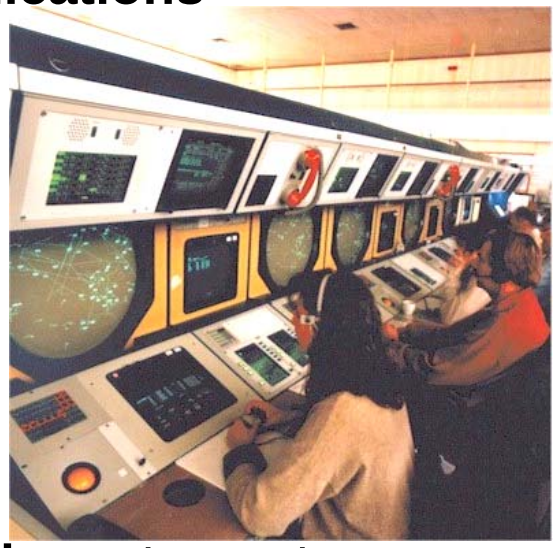
- **Given the European mandate for Mode S surveillance which will result in all new AIRBUS and Boeing aircraft implementing the ADS-B "out" capability by 2006**
  - **October 22, 2004-Airservices Australia and SITA announced they are jointly examining the provision of Automatic Dependent Surveillance Broadcast (ADS-B) services to the air navigation service providers in the Asia-Pacific region.**
  - **The announcement has generated considerable interest with the ATS Providers around the world.**
  - **The IATA Asia/Pac RCG has established a 7 airline member ADS-B Task Force.**
  - **SITA/Airservices plan to establish an initial trial/demo implementation by the end of this year in the region.**
  - **SITA, together with QinetiQ is currently implementing an ADS-B trial implementation.**

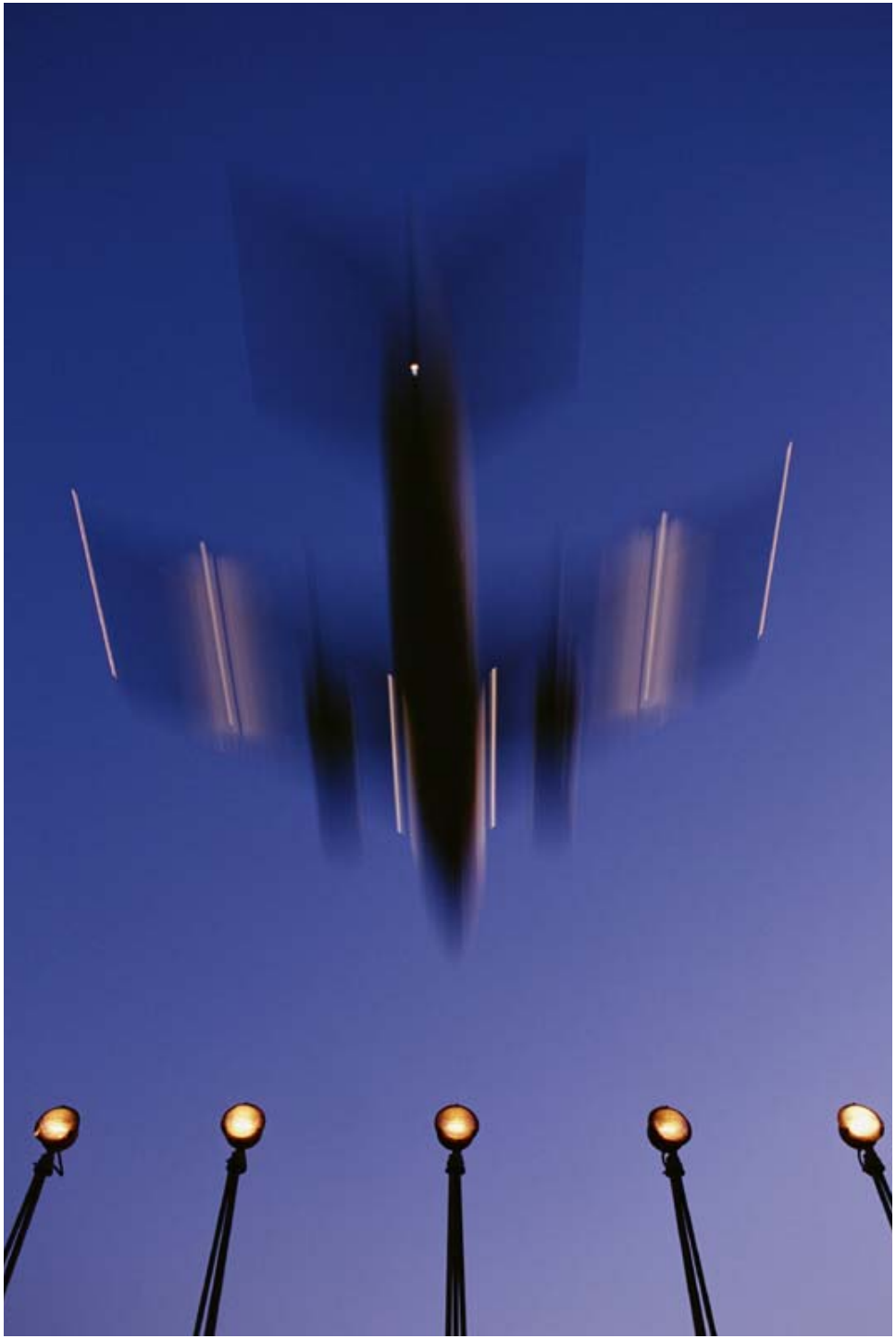
IP Based Solutions

- **SITA Flightlink, based on Inmarsat Swift64, providing aircraft with 64 kbits/sec + communications in two modes.**
  - **Circuit-mode Mobile ISDN Service (MISDN)**
  - **Mobile Packet Data Service (MPDS)**
- **Aircraft can use SITA Flightlink for airborne video conferencing and other in-flight office services.**
- **In future, Swiftbroadband to be enabled through next generation Inmarsat I-4 Satellites providing a nominal data rate of 432 kbps.**
- **Aircraft can use SITA Flightlink to provide IP service to Electronic Flight Bags enabling new applications.**
- **IP Over VDL Mode 2**
  - **SITA has demonstrated in lab environment.**
  - **Discussions in AEEC Datalink Systems Subcommittee.**

Satellite Cockpit Voice benefits

- **Cockpit voice in Oceanic and Remote regions**
  - **Outside VHF coverage the voice communications alternatives are HF and satellite.**
- **HF Voice drawbacks**
  - **Interference, variability and delays**
  - **No Direct pilot/controller channel**
- **Benefits of Satellite Voice**
  - **Pilots talk directly to controllers**
  - **Enables complex communications**
  - **Easy management of low probability / high cost events**
- **Air Traffic Service Providers in the North Atlantic, South Africa Air Traffic and Navigation Services, and possibly others investigating use of Satellite Voice**





Thank you for your attention

For further information please contact
Kathleen.Kearns@sita.aero
Phone: (703) 491-0661